



Translation

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B02/0141PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/011736	International filing date (day/month/year) 23 October 2003 (23.10.2003)	Priority date (day/month/year) 23 October 2002 (23.10.2002)
International Patent Classification (IPC) or national classification and IPC C07D 301/12		
Applicant BASF AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 08 March 2004 (08.03.2004)	Date of completion of this report 28 July 2004 (28.07.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/011736

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages _____ 1-8 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages _____ 1-7 _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the drawings:
 pages _____ 1 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/11736

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1 - 7	YES
	Claims		NO
Inventive step (IS)	Claims	1 - 7	YES
	Claims		NO
Industrial applicability (IA)	Claims	1 - 7	YES
	Claims		NO

2. Citations and explanations

1. Relevant Documents

Reference is made in the present report to the following search report citations D1 to D4; the same numbering will be used throughout the procedure:

D1: EP-A-0 719 768 (ARCO CHEMICAL TECHNOLOGY) 3 July 1996
(1996-07-03)

D2: EP-A-0 467 538 (THE BOC GROUP, INC.) 22 January 1992
(1992-01-22)

D3: WO 02/14298 A (ENICHEM S.P.A.) 21 February 2002 (2002-02-21)

D4: EP-A-0 646 558 (THE BOC GROUP, INC.) 5 April 1995
(1995-04-05)

2. Novelty

The present application relates to a method for the continuous recirculation of unconverted olefins during the epoxidation of olefins with hydroperoxides into oxiranes (claims 1-6) and to a device for carrying out said method (claim 7).

The method according to claim 1 comprises the following steps:

- (i) compressing and cooling the flow of exhaust gas;
- (ii) separating the olefin by distillation;
- (iii) epoxidating the olefin that was separated out in step (ii) with hydroperoxide.

The device for carrying out said method comprises the following:

- a) reactor,
- b) compressing apparatus,
- c) distillation column,
- d) C₃ splitter for carrying out separation.

Neither the aforementioned steps (i) to (iii) of the present method nor components a) to d) of the device for carrying out said method were found in any of documents D1 to D4. For this reason, all of the subject matter of the present application is considered novel within the meaning of PCT Article 33(2).

3. Inventive Step

The problem addressed by the invention was that of providing an improved method for continuously recirculating unconverted olefins during the epoxidation of olefins with hydroperoxides into oxiranes.

Document D1, which is considered the closest prior art, discloses a method wherein a gas mixture consisting of the olefin and oxygen, said gas mixture having been derived from the decomposition reaction of the hydrogen peroxide used as a hydroperoxide during epoxidation, is separated and the olefin is absorbed from said gas mixture into a liquid absorbing medium (claim 1). Document D1 does not mention the compression of exhaust gases.

The solution to the above problem consists in providing a method wherein the exhaust gases are compressed first and the olefin is then separated and further epoxidated. The method is described in claim 1. The present method appears to be simpler than the method according to document D1 and has the following advantages: the present method does not use any additional inert gas or an absorption system.

Although document D2 mentions a possible compression of the exhaust gas before the separation of the olefin (page 2, lines 52-56), it is not supported by any concrete embodiments. Furthermore, the method according to prior art document D2 employs pure or atmospheric oxygen rather than hydroperoxides for the epoxidation.

The solution proposed in claim 1 of the present application is not considered obvious (PCT Article 33(3)), since the prior art documents do not disclose technical teaching with regard to a possible compression and subsequent distillation that would be sufficient to prompt a person skilled in the art who was engaged with the present problem to modify or adapt the closest prior art and in this way to arrive at subject matter falling within the scope of the present claim.